BULLETIN

of the

ONTARIO COLLEGE OF PHARMACY

Vol. IX No. 5 | TORONTO, Ontario | November, 1960
H. J. Fuller, Editor

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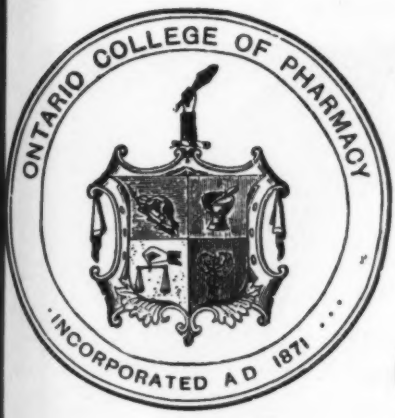

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The Ontario College of Pharmacy is the pharmaceutical licensing body for the Province of Ontario, Canada. All pharmacists licensed in Ontario are *IPSO FACTO* members of the College.

The majority of contributors to the Bulletin are members of the Faculty of Pharmacy, University of Toronto. However, contributions are welcomed from all members of the College.

Published five times a year, January, March, May, September and November by the authority of the Council of the Ontario College of Pharmacy.

Editorial Office, 46 Gerrard St. East, Toronto 2, Ontario

Circulation 4400

Authorized as second class mail, Post Office Department, Ottawa.

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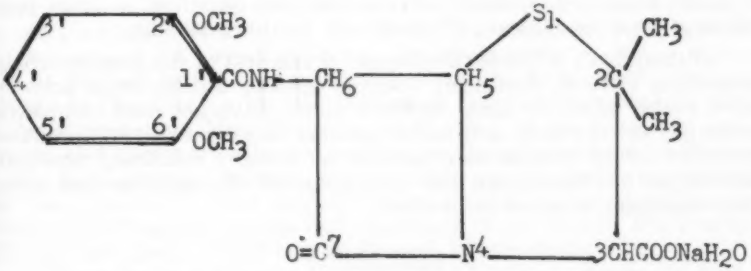
A NEW PENCILLIN

Dr. Ross M. Baxter

In a previous article (1) it was indicated that one of the properties of a new penicillin which would make it more valuable than those already available would be an antibacterial effectiveness against microorganisms that are resistant to the presently available penicillins. It was stated that such a penicillin would therefore probably have a lowered inactivation sensitivity to the enzyme penicillinase. The introduction of the partially synthetic penicillin (Broxil, Syncillin) was a step in this direction since it was more slowly inactivated by penicillinase than was penicillin G or V. Another semi-synthetic penicillin has very recently been announced which was originally designated as BRL 1241 and X1497 and is to be made available under the name Celbenin (Beecham) and Staphcillin (Bristol). This penicillin has been reported to be almost totally resistant to staphylococcal penicillinase (2). Whereas with penicillin G, penicillin V and Broxil antibacterial activity was progressively reduced in the presence of increasing amounts of penicillinase, with BRL 1241 the minimum inhibitory concentrations remained almost unchanged even in the presence of relatively high concentrations of penicillinase (3). The structure of this new penicillin is given below.



Sodium 6-(2',6'-dimethoxybenzamido)
penicillanate monohydrate

In contrast to the first of the semi-synthetic penicillins (Broxil, Syncillin, Maxipen, Alpen, Chemipen, Dramacillin S, Darcil) which had high acid stability, Celbenin (BRL 1241) and Staphcillin (X1497) are unstable in acid media and are therefore unsuitable for oral administration. After parenteral administration rapid absorption takes place producing peak blood levels within the first hour after injection. The blood concentration required for therapeutic effectiveness against sensitive organisms is in the range of 2 to 6 ug per ml. These levels are approximately 100 times greater than the effective blood concentrations of penicillin G. It is evident then that continued high blood levels must be maintained requiring relatively large, repeated doses of the new penicillin (2, 4, 5). The usual dose is one gram (the equivalent of 10,000,000 units of penicillin G) administered every four hours. The excretion pattern of this Celbenin apparently resembles that of penicillin G in that the greater proportion of an administered dose is excreted, unchanged, in the urine within a few hours after injection with most of the remainder being excreted in the bile.

At blood penicillin concentrations of 2 to 6 ug per ml., this new penicillin is strongly bacteriostatic and bacteriocidal against staphylococci which are resistant to high concentrations of penicillin G, penicillin V or phenethicillin (Broxil, Syncillin) as well as against staphylococci which are sensitive to the latter antibiotics. However as with other semi-synthetic penicillins BRL 1241 and X1497 have a narrower range of effectiveness than that of the natural penicillins (G and V). It would appear therefore that the main indication for this new penicillin is in the treatment of staphylococcal infections resistant to other antibiotics. It is interesting to note (3) in this regard that preliminary experiments suggest that a penicillinase-producing strain of Staphylococcus pyogenes (E3) after several subcultures in the presence of BRL 1241, reverted to the penicillin sensitive state and no longer produced penicillinase even after repeated subculture in Penicillin G, Penicillin V or Broxil.

The new penicillin appears to have the same low order of toxicity as penicillin G and V. Urticarial and other skin rashes have occurred in a few instances, although several patients sensitive to other penicillins showed no evidence of sensitivity to this penicillin.

Although all of the earlier hopes for the first of the semi-synthetic penicillins (Broxil, Syncillin) such as greater antibacterial activity, more highly effective blood concentrations, have not been completely borne out (6) the early indications are that this most recently produced penicillin offers considerable promise as being a relatively non-toxic and highly effective agent for the treatment of staphylococcal infections resistant to other antibiotics.

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ROSS M. BAXTER.

PHARMACY ALUMNI ASSOCIATION

H. M. Corbett

The Pharmacy Alumni Association held a Dinner, in honour of the Graduating Class of 1910, in the assembly Hall, Faculty of Pharmacy, on the evening of Saturday, October 15, 1960.

Golden Anniversary Certificates, provided by the Ontario College of Pharmacy, were presented by Mr. H. A. Jessop, Mr. R. W. Knaggs, and Mr. M. R. Osborne, members of the College Council. The following members of the Class of 1910 were present:—

Mr. John Burgess, Toronto.
Mr. F. J. Hind, Bracebridge.
Mr. W. G. Ionson, Hamilton.
Mr. J. A. Longfield, Toronto.
Mr. LeRoy Louks, Toronto.
Mr. J. A. MacDonald, Toronto.
Mr. C. B. Norton, Agincourt.
Mr. H. Whiteman, Willowdale.
Mr. J. F. Willis, Aurora.

Mr. John Burgess expressed the appreciation of his classmates for the certificates and for the very pleasant reunion and dinner.

The following members of the Class were not able to be present:—Mr. J. J. Daley, Ottawa, Mr. G. N. Elwin, London, Mr. C. L. Guest, Toronto, Mr. H. H. Knapton, London, Mr. C. W. Liddle, Windsor, Mr. F. A. McGachie, Hamilton, Mr. B. R. MacKenzie, Toronto, and Mr. R. R. Work, Toronto.

Mr. V. L. Mutton acted as Chairman. Greetings from the University of Toronto Alumni Association were brought by Mr. J. C. Evans, Director of Alumni Affairs. Dean Hughes introduced the guest speaker, Mr. J. H. Sword, Executive Assistant to the President of the University of Toronto. Mr. Sword gave a thoughtful address on the subject "A prescription for the apothecary". (The address will be printed in the January issue of the Bulletin of the Ontario College of Pharmacy.) Mr. H. C. Peacock thanked the speaker. Miss Alice Rutledge and Mrs. B. G. Shvemar acted on the reception committee, and they were also responsible for the presentation of flowers to the lady guests. Corsages for the lady guests, and boutonnieres for the guests of honour were provided by the Ladies' Auxiliary to Toronto Pharmacists, the Ladies' Auxiliary to the Rho Pi Phi Fraternity, and the Ladies' Auxiliary to Rokeah Pharmacists.

This is the first dinner to be sponsored by the re-organized Pharmacy Alumni Association. It was held at the time of the Annual Homecoming Weekend, in conjunction with other celebrations in various deparments of the University of Toronto. We hope it may become an annual event.

H. MILTON CORBETT,
President,
Pharmacy Alumni Association

TO ALL ONTARIO PHARMACISTS:

The Registrar's Office of the Ontario College of Pharmacy has been notified of 4 changes in Schedule F, Food and Drug Regulations, effective **AT ONCE.**

I would suggest that you make the necessary changes on your copy of Card No. 4, Prescription Drugs, August, 1959,, issued by the Food and Drug Directorate, Ottawa.

1. **ADD — PART I**

   Bemegride

   Bemegride has been sold under the trade name **MEGIMIDE** (Abbott Laboratories) for a number of years as a barbituric acid antagonist. It is now proposed for sale as a central nervous system stimulant by Winley-Morris Company Ltd., Montreal, under the trade name **MIKEDIMIDE.** Chemically the drug is 3, 3 methylethylglutarimide.

2. **ADD — PART II**

   Emylcamate

   Emylcamate is an ataractic drug submitted by Merck & Company Limited, proposed to be sold under the trade name **STRIATRAN.** Chemically the drug is l-ethyl-l-methylpropyl carbamate.

3. **ADD — PART II**

   Tranylcypromine

   Tranylcypromine is an antidepressant drug submitted by Smith, Kline and French Inter-American Corporation and proposed to be sold under the trade name **PARNATE.** Chemically it is Trans-dl-2-phenylcyclopropylamine.

4. **ADD — PART II**

   Phenthoxate—under the heading "Phenothiazine derivatives, the following and their salts".

   Phenthoxate dimaleate is an anti-anxiety agent with mild sedative effects submitted by Schering Corporation Limited, and proposed to be sold under the trade name **TINDAL.** Chemically the drug is 1-(2-hydroxyethyl)-4-[3-2-(2-acetyl-10-phenothiazinyl)-propyl] piperazine dimaleate.

This is the third Order of Council amending the prescription drug list as it appears on your Prescription Drug Card, No. 4; the other two changes, as issued by the Ontario College of Pharmacy, were dated April 27, 1960 and December 4, 1959.

IS YOUR LIST UP TO DATE?

CHECK IT NOW!! CHECK IT NOW!! CHECK IT NOW!!

P. T. MOISLEY,
Registrar-Treasurer.

September 28, 1960.

GLIMPSES BEHIND THE STORY OF PRODUCTION OF STEROID HORMONES

Dr. S. K. Sim

All pharmacists understand the importance of the many steroid hormones and their derivatives as medicinal agents to-day. Even without any detailed discussion of the pharmacological actions and therapeutic uses, the pharmacist who daily fills prescriptions of all kinds needs no detailed statistics to realize the considerable volume of these agents being prescribed by the physicians in recent years. Some of these steroid hormone substances, e.g., cortisone and progesterone, have been in use as medicinal agents for some fifteen years or more. Those who have the experience of dispensing these for a decade or two must have also noticed their greater availability in recent years. But perhaps many of us who are in the pharmaceutical fields other than that directly involved in the industrial production of these steroid hormones may not always be aware of the several factors which have very largely contributed to making these agents available in considerably larger quantities and lowering the production cost. Among these factors perhaps the most outstanding ones are: (a) the discovery of newer sources of raw materials from which these steroid hormone substances may be made, and (b) certain recent techniques and methods by which the source materials are converted to the therapeutically useful end-products. A few brief glimpses behind the scene, as it were, into the story of the development of these factors may be of interest.

(a) **Source materials.**—In the 1930's, the corticosteroids were obtained from animal adrenal glands, and progesterone obtained from corpus luteum tissues of animal ovaries. In the case of the corticosteroids, some 20,000 cattle would yield about 1000 pounds of adrenal glands, which would then yield 200-350 mg. of cortisone. In the case of progesterone, the ovaries from some 50,000 sows would yield about 12.5 gm. of a crude extract of the hormone, which would then give some 20 mg. of pure progesterone. From these figures, it would not be difficult to understand that during this period when these animal glands were the only source materials from which to obtain these hormone substances, apart from the high cost of production, there were not sufficient quantities of these hormones available for scientific and clinical studies or for therapeutic uses.

A decade or so later, chemical synthesis of several of the corticosteroids (including cortisone) was achieved in the years 1942-1950. In such chemical synthesis, some 1200 pounds of desoxycholic acid, for

instance, as starting material would yield about 900 gm. of cortisone. This was certainly an improvement compared with the sole dependence on animal glands. Still, the process involved as many as 25-30 chemical operations (reaction steps) many of which gave rather low percentage yields. Chemical synthesis of progesterone, to take another example, was achieved by several methods in the late 1930's, using as starting materials such as stigmasterol (from soya bean oil) or certain by-products of androstenolone and cholesterol production. Some of the steps involved also gave rather low percentage yields.

During the period 1944-1954, several schemes were sponsored by various organizations including the National Institute for Medical Research (England), the science service laboratories of the U. S. Department of Agriculture, the U. S. Public Health Service, and industrial firms, to search for steroid compounds from plants. Thousands of plant samples covering several hundred different plant species were collected, screened, and tested in these schemes. These efforts eventually led to the discovery and use of several plant steroids as starting material for producing progesterone and corticosteroids. Among the most useful (for this purpose) plant steroids discovered during this period are diosgenin, hecogenin, and botogenin. Another useful steroid, stigmasterol, obtainable in commercial quantities from soya bean oil, was introduced for use for this purpose in the late 1930's, although improvements in methods of isolation and conversion to the hormone substances were realized a decade or so later.

Hecogenin, first isolated from a plant from Texas, **Hechtia texensis**, can also be obtained from **Agave sisalana** from Africa and Mexico, and several other plant species. Botogenin, which occurs side by side with hecogenin in some plants, and which can also be converted to hecogenin and diosgenin by chemical means, can be obtained from **Dioscorea mexicana, Dioscorea spiculiflora** (sometimes referred to as Mexican yams), and some other related plant species. These plant steroids can be converted by chemical means to progesterone, which through further chemical and micro-biological methods can then be converted to several of the important corticosteroids, androgens and oestrogens. The discovery and use of these plant steroids as starting materials for producing the steroid hormone substances have contributed very largerly to the production of considerably greater quantities of these medicinal agents currently available, and to the reduction in the cost of their production. The availability of chemically synthesized cortisone, for instance, in 1948-1949 in terms of several hundred grams in the whole of North America, became a supply in the order of some 7000 pounds in 1952 with the help of these plant steroids. The cost of producing cortisone by chemical synthesis from bile acids in 1949 at about $200 per gram (of bulk material, and not of finished dosage forms) is said to have dropped, by 1955-1958, to about $3.50 per gm. when made from progesterone that was obained by chemical conversion of diosgenin and other plant steroids. The chemical structures of cortisone, progesterone, and hecogein are shown in Figure 1.

(b) **Recent techniques and methods.**—In the last two decades, numerous modifications and improvements have been achieved by many chemists in the chemical methods of isolation and of synthesis

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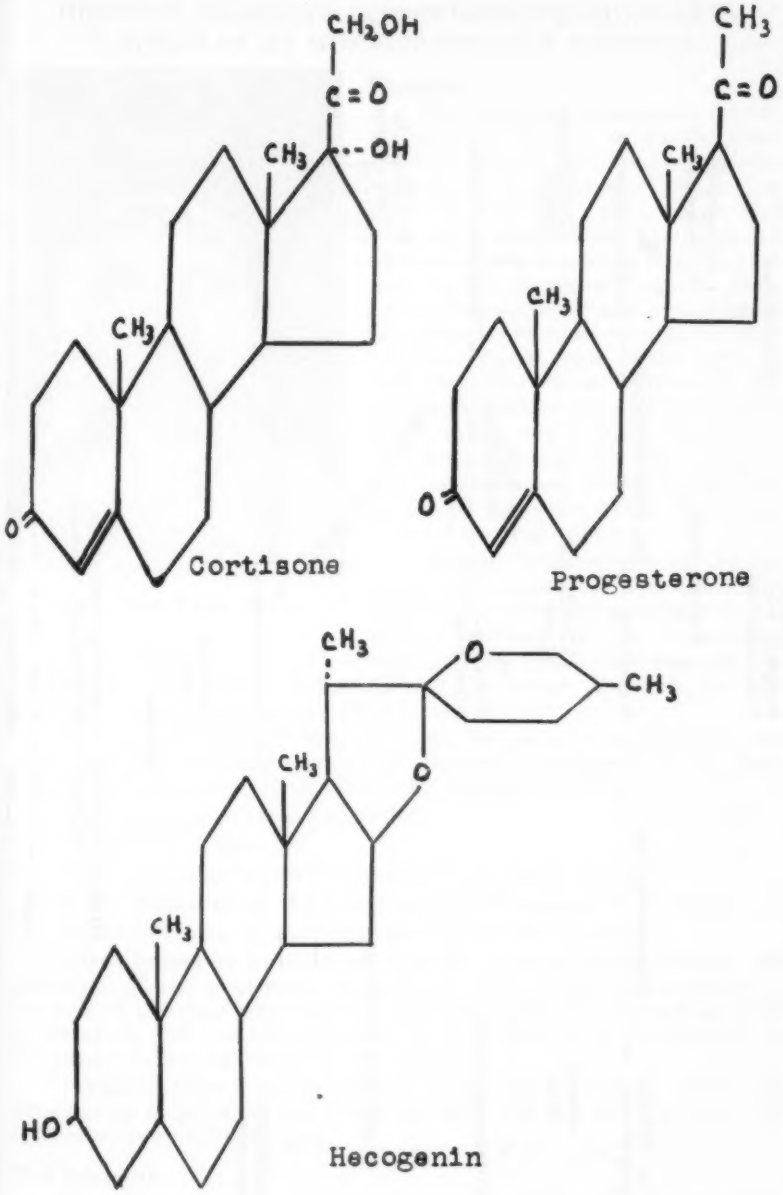

Figure 1. Chemical structures of cortisone, progesterone, and hecogenin.

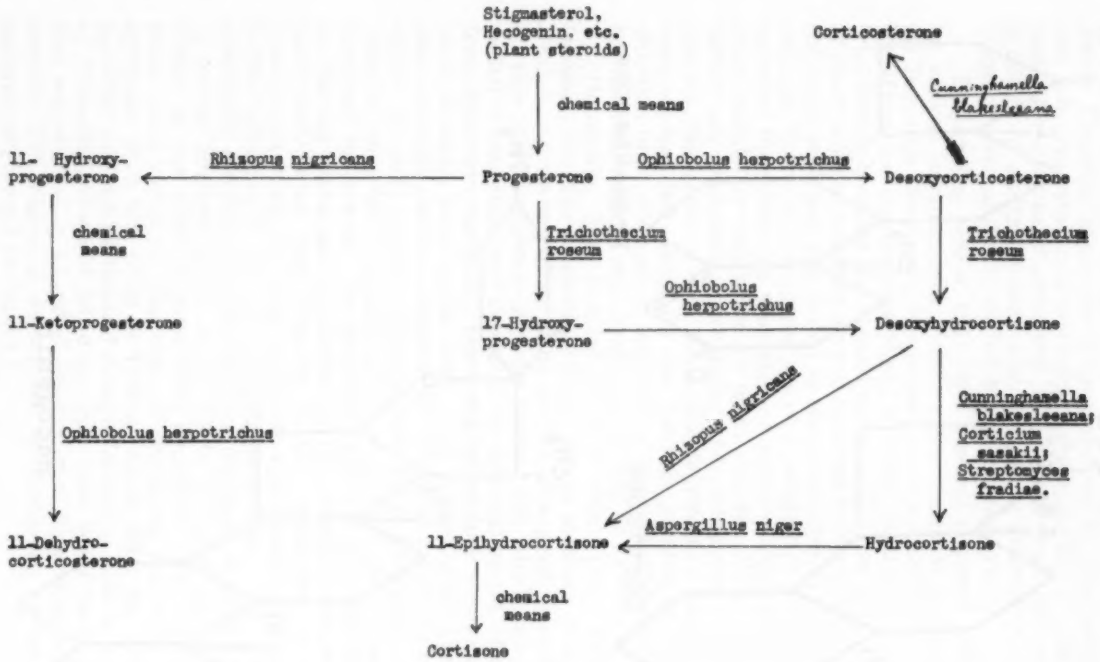

Figure 2. Utilization of micro-organisms in the synthesis of steroid hormone substances.

(Adapted from L.F. Fieser and M. Fieser: "Steroids", New York, Reinhold, 1959; and E. Ramstad: "Modern Pharmacognosy", New York, McGraw-Hill, 1959.

HOSPITAL PHARMACY INTERNESHIP PROGRAM GETS UNDERWAY AT WOMEN'S COLLEGE HOSPITAL

Sister Ruth Marie Hunter

Program

The first post-graduate program of organized training in hospital pharmacy in Ontario has been established recently at the Women's College Hospital in Toronto. This fifty week pharmacy interneship has been designed to provide supervised experience in all phases of hospital pharmacy administration and practice, and also includes planned periods of observation in other areas of the hospital, and participation in conferences and staff meetings pertaining to hospital organization and medical therapy.

Responsibility for the program has been assumed jointly by the hospital and the Faculty of Pharmacy, University of Toronto.

Weekly pharmacy staff conferences are conducted by the chief pharmacist with the guidance of the faculty advisor on the interneship program, and these serve to co-ordinate the theory and the practice of hospital pharmacy, and endeavour to bridge the gap between academic training and actual experience.

In the first half of the program, progressive experiences are scheduled on a weekly basis and the interne is assigned to and given supervised instruction in the following specific activities.

Inpatient and general dispensing.

Outpatient dispensing.

Bulk compounding and preparation of sterile products.

Bulk compounding and prepackaging of non-sterile products.

Administration of pharmacy services in the hospital.

After becoming acquainted with the overall administration and operation of the pharmacy department, these areas are revisited in the role of the staff pharmacists, assistant chief pharmacist, or chief pharmacist, and the time interval in each section is determined by the progress and aptitudes of the interne.

Prepared papers are presented at monthly seminars which are attended by members of the pharmacy staff, Faculty of Pharmacy, and interested hospital personnel.

The Hospital

The Women's College Hospital was founded in 1913. It is a fully accredited public hospital with 279 adult beds and 103 infant bassinets, and has all branches of medicine staffed by women physicians and surgeons. The hospital is approved by the Faculty of Medicine, University of Toronto as a teaching hospital for medical students in

(Adapted from L.E. Fiese and M. Fiese: "Steroids", New York, Reinhold, 1959; and E. Ramstad: "Modern Pharmacognosy", New York, McGraw-Hill, 1959.

obstetrics and gynecology, medicine, and surgery, by the Canadian Medical Association for the training of junior medical internes, by the Royal College of Physicians and Surgeons of Canada for resident training in anesthesia, bacteriology, internal medicine, obstetrics and gynecology, general surgery, and pathology, and by the Department of Health, province of Ontario for the training of student nurses.

The Pharmacy is in the new wing of the hospital which was opened in October, 1956. A generous donation from the Bickell Foundation helped to provide the present facilities which were planned and developed to accommodate a pharmacy interneship program.

The Pharmacy is located on 2 floors of the northwest corner of the hospital. The outpatient and inpatient dispensing areas, the office, library, active storage room and a minor manufacturing room are located on the main floor. The outpatient pharmacy is directly connected to the rest of the pharmacy department and is near the outpatient waiting-room. On the service floor below, are the sterile solution room, area for bulk compounding, prepackaging, and filling ward baskets, as well as the bulk storage room. A stairway connects this section with the rest of the Pharmacy on the main floor. The total area of the Pharmacy is 1,596 sq. ft.

The pharmacy staff includes four registered pharmacists, two lay helpers and one office clerk.

The Pharmacy department complies with the Minimum Standard for Pharmacies in Hospitals as adopted by the Canadian Society of Hospital Pharmacists.

Relationship to Faculty of Pharmacy, University of Toronto

The Joint Committee on Pharmacy Interneship serves as a means of communication between the hospital and the Faculty of Pharmacy, University of Toronto, with whose co-operation this program is conducted. The membership is as follows:

Hospital—Administrator or her appointed representative, director of nursing, and the chief pharmacists.

Medical Staff—Representative from Medical Advisory Committee, and the Chairman of the Food and Drug Committee.

Faculty of Pharmacy—Dean or his appointed representative, and the faculty advisor on interneship program.

Written reports on the progress of the interne are relayed by the administrator to the committee which has assumed the responsibility for the guidance and the development for the program.

The interne, with the approval of the committee is encouraged to enroll in academic courses at the University of Toronto.

Upon the satisfactory completion of the program, the candidate is awarded a certificate by the Women's College Hospital.

The first interne

Sister Ruth Marie Hunter, a Sister of Charity of Halifax, Nova Scotia, holds a B.A. degree from Mount Saint Vincent College, Halifax, and taught school in Brooklyn, New York, Halifax, N.S. and Quebec City, Que. In 1960, she received her Diploma in Pharmacy from the Maritime College of Pharmacy, where Sister was the recipient of the National Canadian Drugs Medal for highest standing in her class.

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A REVIEW OF THE METHODS OF CALCULATION OF ISOTONICITY

While it may seem desirable to prepare isotonic ophthalmic solution, the necessity of isotonicity is not deemed as necessary as was formerly thought. Riegelman and Vaughan (1) have stated the following: "It is desirable that any eye solution be . . . isotonic . . . but no one has lost an eye because a solution was . . . mildly irritating. The instillation of an unsterile solution . . . has all too often been disastrous". This statement coupled with two other facts makes it seem doubtful if isotonicity is necessary (although it is desirable, particularly with ophthalmic solutions which are to be used for a prolonged period). These facts are:

1. The original isotonic calculations, based on a 1.4% sodium chloride equivalent (now established as incorrect), adopted by the Swiss Pharmacopoeia and which found acceptance in many official compendia for years, did not cause any appreciable damage to ocular tissue. The work of Krogh and his associates (2) as reported in 1945 and Husa and Dale (3) in 1948, accumulated evidence showing that this value of 1.4% was inaccurate.

2. Various workers conducted tests with various concentrations of sodium chloride and the results would indicate that the limits of tolerance of ophthalmic solutions may have a wide range.

There are four methods by which isotonic solutions may be prepared, namely:

(a) Calculation from molecular weight,
(b) Calculation from depression of freezing point,
(c) Calculation using sodium chloride equivalents,
(d) Calculation by the Sprowl's method.

Calculation from molecular weight may be used when the freezing point depression value of a 1% w/v or the sodium chloride equivalent of a particular substance is not known. The formula used is:

$$W = \frac{M \times 0.03}{N}$$

where W = the percentage strength (w/v) of the isotonic solution required

M = the molecular weight of the dissolved substance

N = the apparent number of ions which one molecule of the substance would form in aqueous solution.

Two facts should be borne in mind; first, this method is not used to make an isotonic solution containing more than one substance, and secondly, the calculated values for ionizable substances will be slightly lower than those obtained using either freezing point depression or sodium chloride equivalent values. With nonionizable substances, the calculated values are more precise.

Calculation from the depression of the freezing point is based on observed values for the depression of the freezing point of water by 1% w/v solutions of the various substances. Aqueous solutions are considered to be isotonic with blood serum and lachrymal secretion when they freeze at -0.52°. Accordingly then solutions which are

normally hypotonic to the blood serum or tears, may be made isotonic by the addition of a substance which will depress the freezing point of the final solution to .0.52°. The amount of adjusting substance is calculated from the following equation:

$$W = \frac{0.52 - a}{b}$$

where W = weight in Gm. of the adjusting substance in 100 ml. of final solution, this figure may be considered as percentage w/v;

a = the depression of the freezing point of water produced by the substance(s) in solution; the value for "a" is calculated by multiplying the value for "b" for the substance, given freezing point depression tables*, by the strength of the solution expressed as a percentage w/v;

b = the depression of the freezing point of water produced by 1% w/v of the adjusting substance; the value for "b" is obtained from freezing point depression table.*

It might be well to calculate some examples using this method.

Example 1.—Where a single medicinal substance is present.

℞ Physostigmine Salicylate 2%
Make an isotonic solution.
Send 30 ml.

Assume we are using dextrose as the adjusting substance.

$$W = \frac{0.52 - a}{b} \qquad a = 2 \times 0.09 = 0.18$$

$$b = 0.10$$

$$= \frac{0.52 - 0.18}{0.10} = 3.4\% \text{ w/v.}$$

The quantity of dextrose required is

$$\frac{3.4}{100} \times 30 = 1.02 \text{ Gms.}$$

Example 2.—where two or more medicinal substances are present.

℞ Zinc Sulphate 0.150 Gm. (0.5%)
Boric Acid 0.300 Gm. (1%)
Distilled water to make 30 ml.
Make isotonic with Sodium Chloride

* see table for freezing point depression values.

$$W = \frac{0.52 - a}{b}$$

"a" will be the sum effect of the freezing point depressions.

$Zn SO_4$ 0.5 x 0.086 = 0.043
$H_3 BO_3$ 1.0 x 0.29 = 0.290
a = 0.333

$$= \frac{0.52 - 0.333}{0.576} = 0.32\% \text{ w/v}$$

The quantity of sodium chloride required is

$$\frac{0.32}{100} \times 30 = 0.096 \text{ Gms.}$$

The sodium chloride equivalent is a factor which converts a specified amount of a solute to the amount of sodium chloride which will produce the same osmotic effect. The method of calculation is as follows:

1. Calculate the amount of sodium chloride which is equivalent to each specified ingredient. This is done by multiplying the amount of the ingredient by its sodium chloride equivalent stated in the table.

2. Add the equivalent amounts of sodium chloride.

3. Calculate the amount of sodium chloride alone which would prepare the specified volume of solution.

4. Substract the equivalent amount of sodium chloride (2) from the amount of sodium chloride required alone (3). The answer is the amount of sodium chloride to be added in the prescription.

5. If an ingredient other than sodium chloride, such as dextrose or sodium nitrate, is to be used to make the solution isotonic, divide the amount of sodium chloride (4) by the sodium chloride equivalent of the substance.

For purposes of illustration, the following examples will show the simplicity of this procedure.

Example 1.—where a single medicinal substance is present

℞ Physostigmine Salicylate 2% (0.6 Gm.)
Make an isotonic solution
Send 30 ml.

Assume as before that dextrose is to be the adjusting substance.

Physostigmine salicylate = (0.6 x 0.16*) = 0.096 Gm. sodium chloride

The quantity of sodium chloride required for isotonicity is

$$\frac{0.9 \times 30}{100} - 0.096 = 0.174 \text{ Gms.}$$

From this figure then the quantity of dextrose required would be

$$\frac{0.174}{0.18^*} = 0.97 \text{ Gms. dextrose}$$

Example 2.—where two or more medicinal substances are present

℞ Zinc Sulphate 0.150 Gm.
Boric Acid 0.300 Gm..
Distilled Water to make 30 ml.
Make isotonic with sodium chloride

0.150 Gm. Zinc Sulphate = 0.150 x 0.15 = 0.02 Gm. NaCl
0.300 Gm. Boric Acid = 0.300 x 0.50 = 0.15 Gm. NaCl
Total sodium chloride equivalent is 0.17 Gm.

The quantity of sodium chloride required to make the solution isotonic is

$$\frac{0.9 \times 30}{100} - 0.17 = 0.10 \text{ Gms. NaCl}$$

---

* from sodium chloride equivalents table.

Table of Freezing Point Depressions and Sodium Chloride Equivalent**

SUBSTANCE	Freezing Point Depression of a 1% Solution	Sodium Chloride Equivalent
Atropine Sulphate	0.074	0.13
Borax	0.24	0.42
Boric Acid	0.29	0.50
Cocaine Hydrochloride	0.09	0.16
Dextrose	0.10	0.18
Dextrose Monohydrate	0.091	0.16
Homatropine Hydrobromide	0.097	0.17
Physostigmine Salicylate	0.09	0.16
Physostigmine Sulphate	0.075	0.13
Silver Protein, Mild	0.095	0.17
Sodium Chloride	0.576	1.00
Zinc Sulphate	0.086	0.15

Calculation using the Sprowl's method may be used when an isotonic diluting solution is used as a solvent for the drug. The compounding of most isotonic solutions would be greatly simplified if a few isotonic diluting solutions are maintained as stock solutions.

It should be borne in mind that if the diluting solution is used as a vehicle, the resultant solution will be slightly hypertonic unless specific allowance is made for the drug(s) used. The Sprowl's method uses the technique of dissolving the required amount of drug in sufficient distilled water to make an isotonic solution (this information is derived from a table of values) and then the dilution to volume of this isotonic solution with the isotonic diluting solution. The result is an isotonic solution of the required medicinal strength.

For example:

1. ℞ Physostigmine Salicylate 1%
in Isotonic buffered
solution, q.s. ad. 30.0

Reference to the table* shows that the required quantity of drug (0.3 Gm.) should be dissolved in 5.3 cc. of distilled water Sufficient isotonic buffered diluting solution is added to make a volume of 30 cc. and the prescription is complete as far as its isotonicity and buffering are concerned.

2. ℞ Sodium Sulfathiazole Sesquihydrate 0.6
Isotonic buffered solution, q.s. ad. 15.0

The amount of drug used here corresponds to a 4% solution, and the table shows that the pharmacist would use 7.3 cc. of water for 30 ml. of a 1% solution. For 15 ml. of a 4% solution, he would use 14.6 cc. of water (7.3 cc. x ½ x 4 = 14.6). The isotonic diluting solution is then added to make a total volume of 15 cc.

If more than one drug is contained in the prescription, the volumes of water to be used are additive.

3. ℞ Phenylephrine HCl 0.3
Chlorobutanol 0.2
Distilled Water, q.s. ad. 60.0
M. Ft. Isotonic and buffered nose drops

The quantity of distilled water is determined as follows:

For Phenylephrine HCl
10.7 cc. x ½ x 2 = 10.7 cc.
For Chlorobutanol
8.0 cc x ⅓ x 2 = 5.3 cc.
Total 16.0 cc.

The drugs are to be made into a solution using approximately 16.0 cc. of distilled water (q.s. to 16.0 cc. with water) and then add a sufficient amount of the isotonic diluting solution to make 60 cc. total prescription volume.

* Table of Revised Sprowl's values may be found in more complete detail in J. Am. Pharm. Assoc., Pract. Pharm. Ed., 19, 38 (1958).

TABLE OF REVISED SPROWLS VALUES (4)

Table of "Sprowls Values" showing volume in cc. of water required to dissolve 0.3 Gm. of various drugs before adding isotonic diluting fluid in order to prepare 30 ml. of a solution isotonic with blood serum or tears and containing 1% of the specified drug.

1% (0.3 Gm.) of:	H_2O, cc.
Atropine Sulfate USP	4.3
Boric Acid USP	16.7
Chlorobutanol (Hydrated) USP	8.0
Cocaine HCl USP	5.3
Dextrose, Anhydrous	6.0
Ephedrine HCl NF	10.0
Ephedrine Sulfate USP	7.7
Homatropine HBr USP	5.7
Homatropine Methylbromide USP	6.3
Oxytetracycline HCl USP	4.3
Phenylephrine HCl USP	10.7
Physostigmine Salicylate USP	5.3
Physostigmine Sulfate	4.3
Procaine HCl USP	7.0
Mild Silver Protein NF	5.7
Sulfacetamide Sodium USP	7.7
Sulfathiazole Sodium NF	7.3
Tetracaine HCl USP	6.0
Tetracycline HCl USP	4.7
Zinc Chloride NF	20.3
Zinc Sulfate USP	5.0
Zinc Sulfate, Dried	7.7

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3. Husa, W. J. and Dale, J. K., J. Am. Pharm. Assoc., Pract. Pharm. Ed., 9, 421 (1948)
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D. R. KENNEDY.

FROM THE DESK OF THE FIELD EXTENSION OFFICER

Now that the eighth session of the Faculty of Pharmacy is under way, it is possible to assess to some extent the result of the intensive recruitment campaign conducted during the past year. As shown in the table below, freshman registration increased by 25% over last session.

1959-1960		1960-1961	
First Year	96	First Year	121
Second Year	89	Second Year	99
Third Year	84	Third Year	85
Fourth Year	62	Fourth Year	72
(61 admitted to degree, May, 1960)			

By September, the University of Toronto had received 213 admission applications from Grade XIII students. Some students were refused admission because of their failure to meet the academic requirements; some others, who were admitted, did not register in the Faculty for various reasons. The 121 students in attendance in the First Year are close to the maximum which can be accommodated by the Faculty with its present facilities. A few students are registered in the Pre-Pharmacy courses at the Lakehead College and Assumption University of Windsor; if successful this session, they will be admitted to the Second Year at the University of Toronto in 1961-1962.

Women students are showing an increasing interest in Pharmacy. In 1959-60, 28 women enrolled in the First Year; in the present session there are 34 women in that year. Over the whole Faculty, the percentage of woman students is more than 25%.

Dean Hughes, in his report to the Council of the Ontario College of Pharmacy in November, 1959, said. "It is encouraging to note the upward trend in applications. This should not cause us to lessen but rather to redouble our efforts in the recruitment of good students. Vocational competition is keen for young people today. Pharmacy must obtain its share of good students."

Pharmacists have recognized their responsibility and many of them, using our films and prepared talks, have presented the story of Pharmacy to High School assemblies and to groups who have expressed an interest in Pharmacy.

Last month Dean Hughes was invited to speak to assemblies in each of the Fergus and Arthur High Schools and to a meeting of the Fergus Home and School group in the evening — an excellent recruitment and public relations effort arranged by the Fergus Vocational Guidance teacher, Mr. William Schoales.

In the Watford District High School on October 14th three pharmacists of the district combined to give a presentation.

In November a meeting of High School Principals, Vocational Guidance teachers and students is being arranged at which Pharmacy as a satisfying career will be presented.

Undoubtedly, the increasing number of awards and bursaries has contributed to the success of the recruitment campaign. Some of the awards with the names of the recipients are listed below:

Ontario College of Pharmacy War Memorial Matriculation

Scholarship:—

Miss Joan Woodward, St. Joseph's College School, Toronto.

Abraham Bergson Scholarship:—

Miss Marlene M. Rosenberg, Bathurst Heights, Collegiate,, North York.

Brant Pharmacists' Association Bursary:—

Eugene S. Peycha, Brantford Collegiate, Brantford.

Essex County Pharmacists' Association Bursary:—

Miss Elaine Krassov, Patterson Collegiate, Windsor.

Hamilton Ladies' Auxiliary Bursary:—

D. H. Heine, Westdale Secondary School, Hamilton.

London Pharmacists' Association Bursaries:—

Miss L. E. Logan, London Central Collegiate,, London.

Miss Janet C. Moore, Sir Adam Beck Collegiate, London.

R. S. Wilton, Medway High School, London (Arva).

Quinte Pharmacists' Association Bursary:—

D. W. Robinson, Belleville Collegiate, Belleville.

South Waterloo Pharmacists' Association Bursaries:—

Miss F. M. L. Campbell, Preston High School.

Miss L. E. Galbraith, Glenview Park Secondary School, Galt.

The St. Catharines pharmacists have just inaugurated a Bursary as a memorial to the late Daniel Fiedler. Application for a charter has been made and the trustees are Don Shaw, Chairman, L. Sherman, R. Bender, C. Helmer and H. Main.

On October 25th, 26th and 27th, a Careers Exposition will be held in Galt. Students from the High Schools of the district will be brought into the Armouries to visit displays of various vocations. The pharmacists will be represented using the Careers section of the Mediscope display. Clayton McFadden is the Chairman of the Committee.

On Wednesday, October 26th, an O.C.P. Seminar will be held in St. Thomas. Professors Paterson and Teare, the Registrar and Mr. R. D. Macdonald, General Manager, Jaeger Machine Co. of Canada Ltd., will be the speakers.

An O.C.P. Seminar will be held in St. Catharines on Wednesday, November 16th. Dean Hughes, Professor Nairn, the Registrar and Mr. W. A. Wilkinson will be the speakers. Mr. Wilkinson will explain and report progress on the Green Shield Plan for prepaid prescriptions operating in Essex County.

On Wednesday, October 12th, I was privileged to attend the Northern Ontario Pharmacists Conference in Sudbury. The Registrar and Professor Kennedy represented the Ontario College of Pharmacy and the Faculty of Pharmacy, respectively. An excellent program was provided and Sister Ste. Rose, Pharmacists at St. Joseph's Hospital, Sudbury, was a tremendous success as the after dinner speaker.

The Council of the College will meet early in November. Committees have been preparing reports on Hospital Pharmacy, Veterinary Pharmacy, Infringement and changes in The Pharmacy Act. A special committee is considering the need for a more realistic practical training program. Minimum standards of equipment and library will be proposed. The licensing of pharmacies, as such, is under consideration.

A pleasing function took place in the auditorium of the Ontario College of Pharmacy on Saturday evening, October 15th. Pharmacists of the class of 1910 were honoured by about one hundred fellow pharmacists at a dinner at which they were presented with certificates in recognition of fifty years of service to Pharmacy.

In my mail the other day I received a reminder that my annual donation to the Canadian Foundation for the Advancement of Pharmacy was due. I sincercely hope that every retail pharmacist will contribute to this worthwhile organization which is doing so much for pharmaceutical education and vocational guidance for Careers in Pharmacy.

G. W. FAIRLEY.

Steroid Hormones—continued from page 90.

of these steroid hormone substances, and these improved methods have certainly contributed greatly to the producion of these agents, including their production from plant materials discussed above. But apart from the chemical techniques and methods, a rather novel and relatively recent development in the last ten years or so, namely, the utilization of micro-organisms, has opened up new ways in parts of the procedure for producing these hormones and their derivatives. This involves the use of appropriate micro-organisms (mostly fungi and Actinomycetes) to carry out specific chemical reaction steps in the conversion of one steroid horomone to another or to a therapeutically useful derivative. In many such instances, the appropriate micro-organism carries out a particular chemical reaction step at a higher efficiency than can be achieved by purely chemical means. A number of these micro-organisms are now used as part of the procedure in the production of some of these steroid hormone substances. Figure 2 shows several examples of these micro-organisms and the reaction steps in which they are used, and gives a simplified outline of the relationship of the utilization of the plant steroids and of the micro-biological methods in the production of several of the steroid hormone substances.

S. K. SIM.

Hospital Pharmacy Internship—continued from page 92.

Upon receipt of a bursary from the Nova Scotia Department of Public Health, she obtained a year's leave of absence from the Halifax Infirmary to take the interneship program, and will return to that hospital in July, 1961.

Interneship Information

Expansion of the program to include 2 pharmacy internes is anticipated in the future.

Each eligible candidate should hold the Bachelor of Science in Pharmacy degree from a recognized university, including at least one course in hospital pharmacy administration.

Preference may be given to candidates who have previous experience in hospital pharmacy practice amounting to at least 6 months. Applications should be made in duplicate not later than May 1st, on forms which may be obtained from the Secretary, Faculty of Pharmacy, University of Toronto. The date of application will be a factor in the selection of candidates. The program commences on July 1st of each year.

PHYLLIS YAGI.

Change in Annual Fees

Effective January, 1961

I would draw to the attention of all pharmacists that, effective January, 1961, the annual fee to be paid by a pharmaceutical chemist will be $30.00.

It must be taken into consideration that, as of July 1st, 1961, $10.00 of this annual fee is payable to the Canadian Pharmaceutical Association for the pharmacist's membership in the national pharmaceutical association, thus leaving $20.00 from each pharmacist's licence for the direct use of the Ontario College of Pharmacy.

I would also draw your attention to the fact that the work of the Ontario College of Pharmacy is expanding rapidly in the field of Recruitment, Continuing Education for Practising Pharmacists, Public Relations and Inspection Services. This all adds up to greater expenses as outlined briefly on page 1642 of the Minutes of the Semi-Annual Meeting of Council, June, 1960.

In spite of this increase, the fee of the practising pharmacist will amount to only 5½c per day which, in our estimation, is a very reasonable amount for professional dues.

P. T. MOISLEY,
Registrar-Treasurer

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